ANNUAL REPORT FOR 2008

Long Creek Mitigation Site
Mecklenburg County
TIP No. R-2248

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North Carolina Department of Transportation
December 2008

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDICES

SUMMARY

The Long Creek Mitigation Site is located in Mecklenburg County and was constructed in 1996. In order to receive mitigation credit, the site must meet jurisdictional success criteria for both wetland hydrology and vegetation for three consecutive years or until the site is deemed successful. The following report details the monitoring activities during the 2008 growing season. The 2008 data represent results from the eleventh year of hydrologic monitoring.

The daily rainfall data depicted on the gauge data graphs was recorded from an onsite rain gauge that was installed on May 4, 2000. Additional rainfall data used for the 30-70 graph was taken from a gauge in Charlotte from the NC State Climate Office.

Hydrologic success criteria are based on the approved mitigation plan and require that the site demonstrate saturation or inundation within 12 inches of the soil surface for a consecutive 12.5% of the growing season during years of normal rainfall.

For the eleventh year of hydrologic monitoring, eleven of the eighteen groundwater gauges met the success criteria for jurisdictional hydrology (saturation within 12" of the surface for greater than 12.5% of the growing season). Four gauges reported saturation below 5% and three gauges had data in the 5 - 8% range. All four surface water gauges indicated periodic inundation during the growing season.

The status of the vegetation monitoring at the Long Creek Mitigation Site was discussed at the 2003 annual monitoring meeting. It was agreed that vegetation monitoring would be discontinued until completion of the Charlotte Outer Loop (I-485). Upon completion of the highway project, vegetation monitoring would resume for one year. The site was visually monitored from 2003 to 2007. The Charlotte Outer Loop (I-485) was completed in December 2008, and traffic is now open on the roadway. For the 2008-monitoring year, the site was monitored for vegetation. The vegetation monitoring revealed an average tree density of 622 trees per acre. This average is well above the minimum success criteria of 320 trees per acre.

Based on eleven years of monitoring, NCDOT proposes to discontinue all monitoring activities at the Long Creek Mitigation Site for hydrology and vegetation. NCDOT is in the process of identifying areas of site that have routinely not met optimum hydrology with state and federal regulatory agencies. Upon review there is no relevant remediation that would increase hydrologic inputs to the deficit areas. Once these areas are quantified, NCDOT will develop a proposal to rectify outstanding mitigation requirements.

1.0 INTRODUCTION

1.1 Project Description

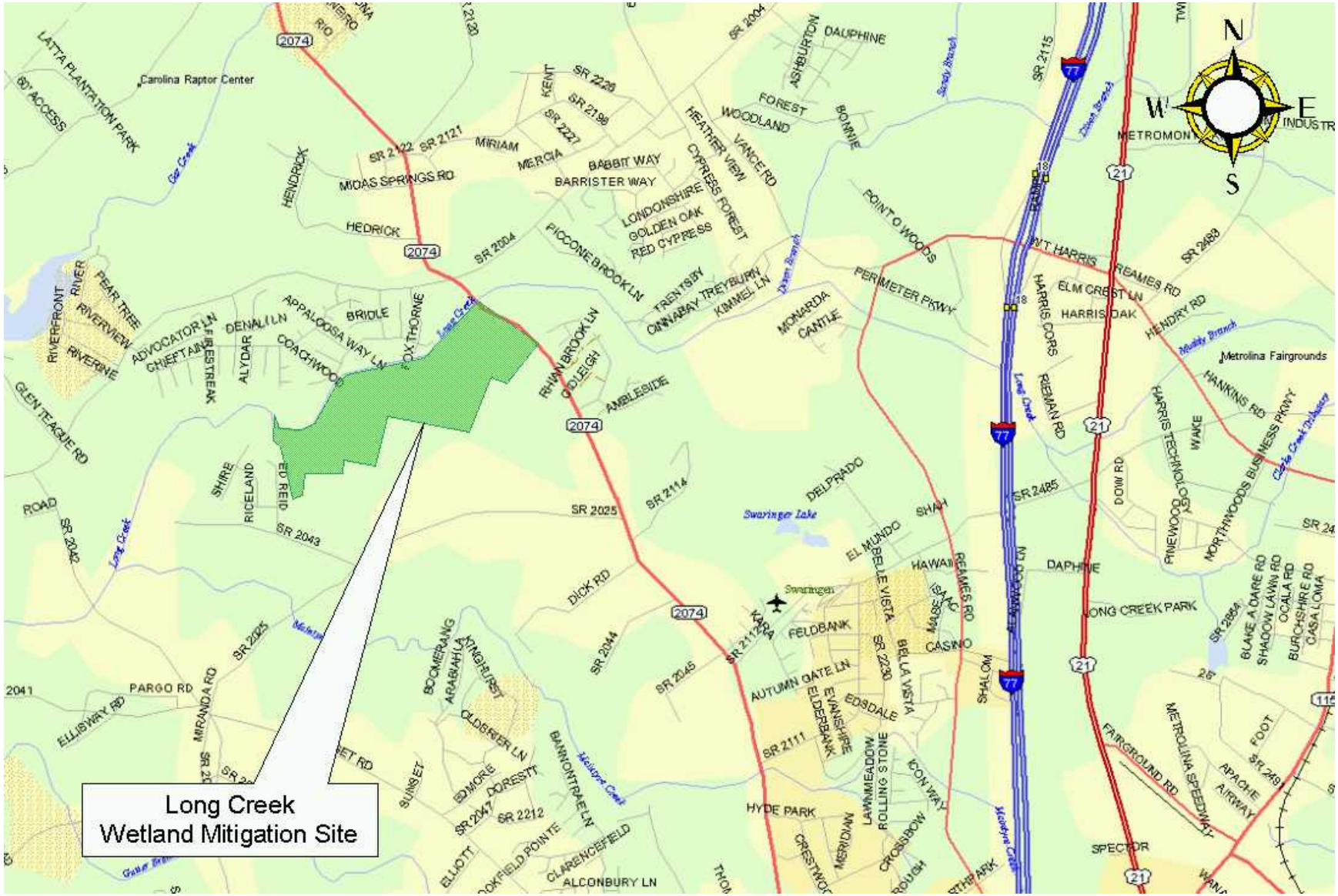
Located in Mecklenburg County, the Long Creek Mitigation Site encompasses approximately 156 acres. It is situated off of Beatties Ford Road (SR 2074) and will be bisected by Charlotte Outer Loop (I-485) (Figure 1). This project will provide compensatory mitigation for wetland impacts associated with sections of the proposed Charlotte Outer Loop (I-485).

The Long Creek Site was designed to restore bottomland hardwood forest wetlands. It was constructed in December 1996 and 37 acres of the planting occurred in 1997. A five-acre portion, consisting of the former haul roads, was planted in early 1998. Groundwater, surface water, and rain gauges were installed in 1998.

1.2 Purpose

Monitoring of the Long Creek Site is required to demonstrate successful mitigation. The success of a wetland site is based primarily on federal guidelines for wetland mitigation, which include minimum standards for hydrologic conditions and vegetation survival. Both hydrologic and vegetation monitoring is conducted throughout the growing season; success criteria must be met for three consecutive years. The following report details the results of the hydrologic and vegetation monitoring for 2008 at the Long Creek Mitigation Site.

Figure 1. Site Location Map



1.3 Project History

December 1996	Grading Construction
March 1997	Site Planted (Except for approximately 5 AC. of Haul Roads-to be Planted by March 1998)
September 1997	Vegetation Monitoring (1 yr.)
October 1997	Monitoring Gauges Installed
March 1998	Haul Roads Planted
March-November 1998	Hydrologic Monitoring (1 yr.)
September 1998	Vegetation Monitoring (2 yr.)
March- November 1999	Hydrologic Monitoring (2 yr.)
September 1999	Vegetation Monitoring (3 yr.)
March- November 2000	Hydrologic Monitoring (3 yr.)
September 2000	Vegetation Monitoring (4 yr.)
March 2001	Site Maintenance
March- November 2001	Hydrologic Monitoring (4 yr.)
June 2001	Vegetation Monitoring (5 yr.)
March- November 2002	Hydrologic Monitoring (5 yr.)
August 2002	Vegetation Monitoring (6 yr.)
March- November 2003	Hydrologic Monitoring (6 yr.)
October 2003	Photograph Monitoring (7 yr.)
October 2004	Nuisance Tree Species Cut
November 2004	Photograph Monitoring (8 yr.)
March- November 2004	Hydrologic Monitoring (7 yr.)
September 2005	Photograph Monitoring (9 yr.)
March- November 2005	Hydrologic Monitoring (8 yr.)

July 2006	Photograph Monitoring (10 yr.)
March- November 2006	Hydrologic Monitoring (9 yr.)
September 2007	Photograph Monitoring (11 yr.)
March- November 2007	Hydrologic Monitoring (10 yr.)
September 2008	Vegetation Monitoring (12 yr.)
March- November 2008	Hydrologic Monitoring (11 yr.)

2.0 HYDROLOGY

2.1 Success Criteria

In accordance with federal guidelines for wetland mitigation, the success criteria for hydrology state that areas must be inundated or saturated (within 12 inches of the surface) by surface or groundwater for at least a consecutive 12.5% of the growing season. Areas inundated for less than 5% of the growing season are always classified as non-wetlands. Areas inundated between 5% and 12.5% of the growing season can be classified as wetlands depending upon such factors as the presence of wetland vegetation and hydric soils.

The growing season in Mecklenburg County begins March 22 and ends November 11 (235 days). These dates correspond to a 50% probability that air temperatures will not drop below 28°F or lower after March 22 and before November 11.[1] Minimum wetland hydrology is required for at least 12.5% of this growing season; for Mecklenburg County, 12.5% equals 29 consecutive days.

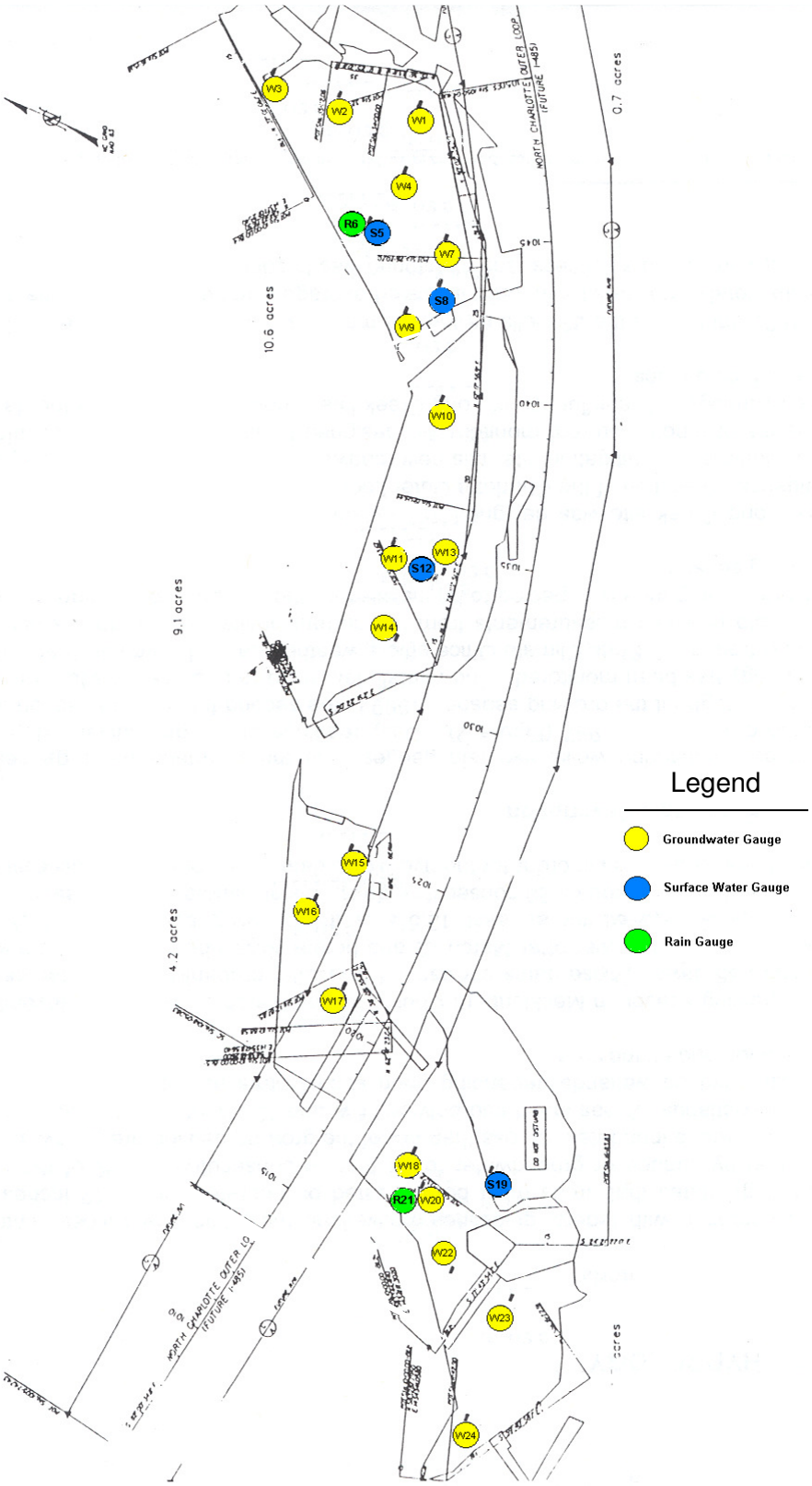
2.2 Hydrologic Description

Eighteen groundwater gauges, four surface water gauges, and two rain gauges were installed in October 1997 (Figure 2). Daily readings of the groundwater depth were taken throughout the growing season. The rainfall data used to analyze the site's water level data are from onsite rain gauges.

The Long Creek Site was designed to function with rainfall and surface water runoff, as its primary hydrologic inputs. The current monitoring gauge configuration was implemented to capture the influence of rainfall and surface water runoff, upon completion of the construction.

[1] Natural Resources Conservation Service, Soil Survey of Mecklenburg County, North Carolina, p.61.

Figure 2. Gauge Location Map



2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

The maximum number of consecutive days that the groundwater was within twelve inches of the surface was determined for each gauge. This number was converted into a percentage of the 235-day growing season. The results are presented in Table 1.

Appendix A includes water depth for each groundwater and surface gauge. Precipitation is shown on each graph as bars. These graphs show the response at each monitoring location of the groundwater level to specific rainfall events. The maximum number of consecutive days is noted on each graph.

2.3.2 Climatic Data

Figure 4 is a comparison of 2007 and 2008 monthly rainfall to historical precipitation for the area. This comparison indicates if 2008 was "average" in terms of climate conditions by comparing the rainfall to that of historical rainfall (data collected between 1977 and 2008). The NC State Climate Office provided all historical data.

For 2008; January and October recorded below average rainfall for the site. The months of February, March, April, May, June, July, September, November, and December recorded average rainfall, while the month of August experienced above average rainfall. Overall, 2008 was experienced an average rainfall year.

2.4 Conclusion

For the eleventh hydrologic monitoring year, eleven of the eighteen groundwater gauges met the success criteria for optimum jurisdictional hydrology (saturation within 12" of the surface for more than 12.5% of the growing season). Four gauges reported saturation below 5% of the growing season, while three gauges reported marginal hydrology between 5% - 8% of the growing season. All four surface water gauges indicated periodic inundation during the growing season after rainfall events.

NCDOT proposes to discontinue monitoring the site for hydrology.

Table 1. Hydrologic Monitoring Results

Monitoring Gauge	<5%	5-8%	8-12.5%	>12.5%	Actual %	Success Dates
LCW-1+				✕	31.1	March 22-June 2
LCW-2	✕				4.7	
LCW-3		✕			5.1	April 5-April 16
LCW-4+				✕	13.6	March 22-April 22
LCW-7+				✕	14.0	March 22-April 23
LCW-9	✕				1.7	
LCW-10+				✕	13.6	March 22-April 22
LCW-11		✕			6.8	April 5-April 20
LCW-13		✕			7.2	April 9-April 25
LCW-14+				✕	13.2	March 22- April 21
LCW-15+				✕	14.9	March 22- April 25
LCW-16	✕				2.1	
LCW-17+				✕	33.6	March 22-June 8 June 23-July 21 Aug 21-Oct 31
LCW-18	✕				4.7	
LCW-20+				✕	14.9	March 22-April 25
LCW-22+				✕	22.1	March 22-May 12 Sept 11-Oct 11
LCW-23+				✕	14.0	March 22- April 23
LCW-24+				✕	15.3	March 22- April 24 Sept 11-Oct 16

+Gauge met success during an average rainfall month (March, April, May, June, July, September, and November).

Specific Gauge Problems:

- Gauge (LCW-13) experienced gauge malfunctions at the beginning of the growing season and was replaced April 8, 2008.

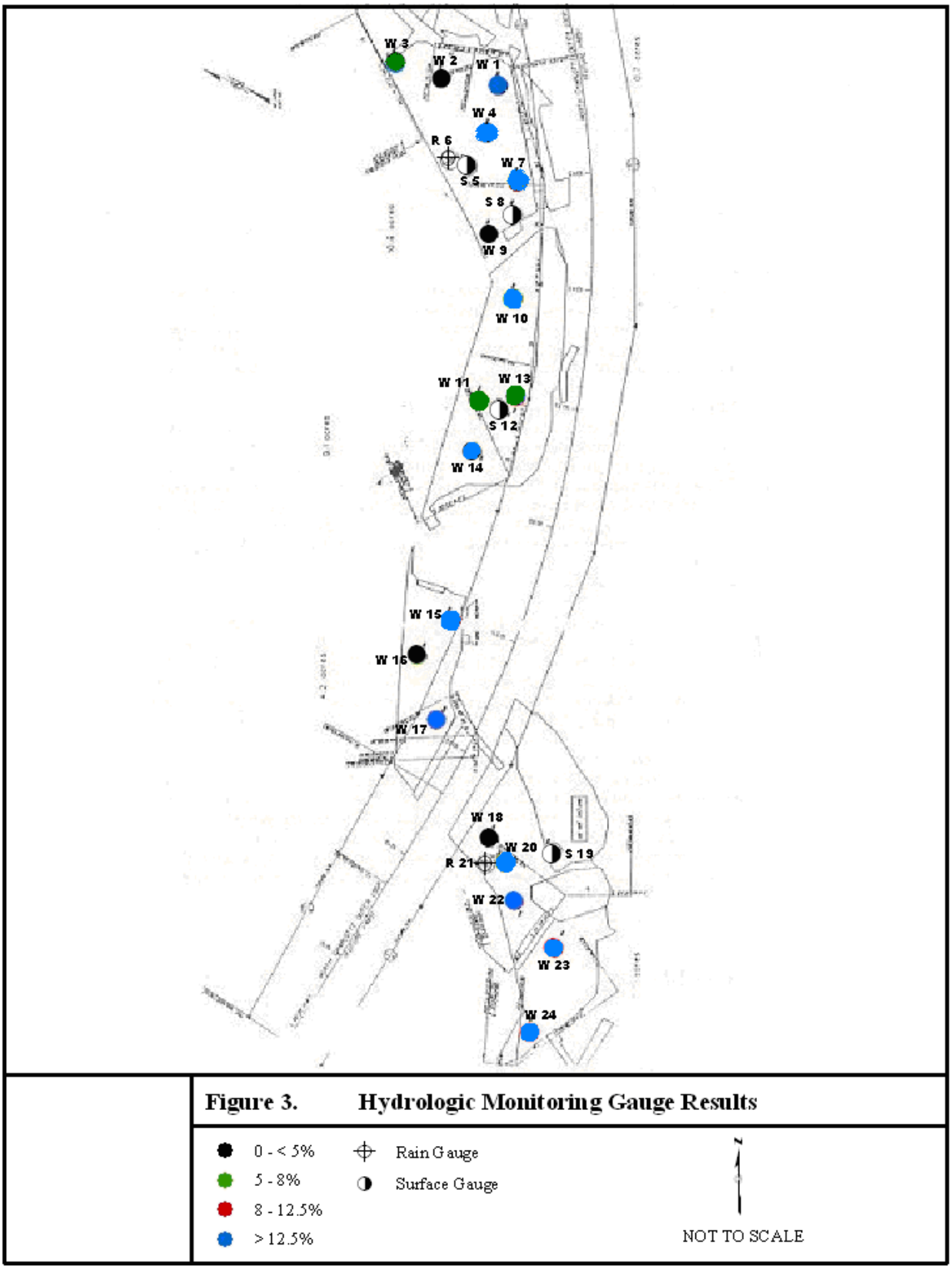
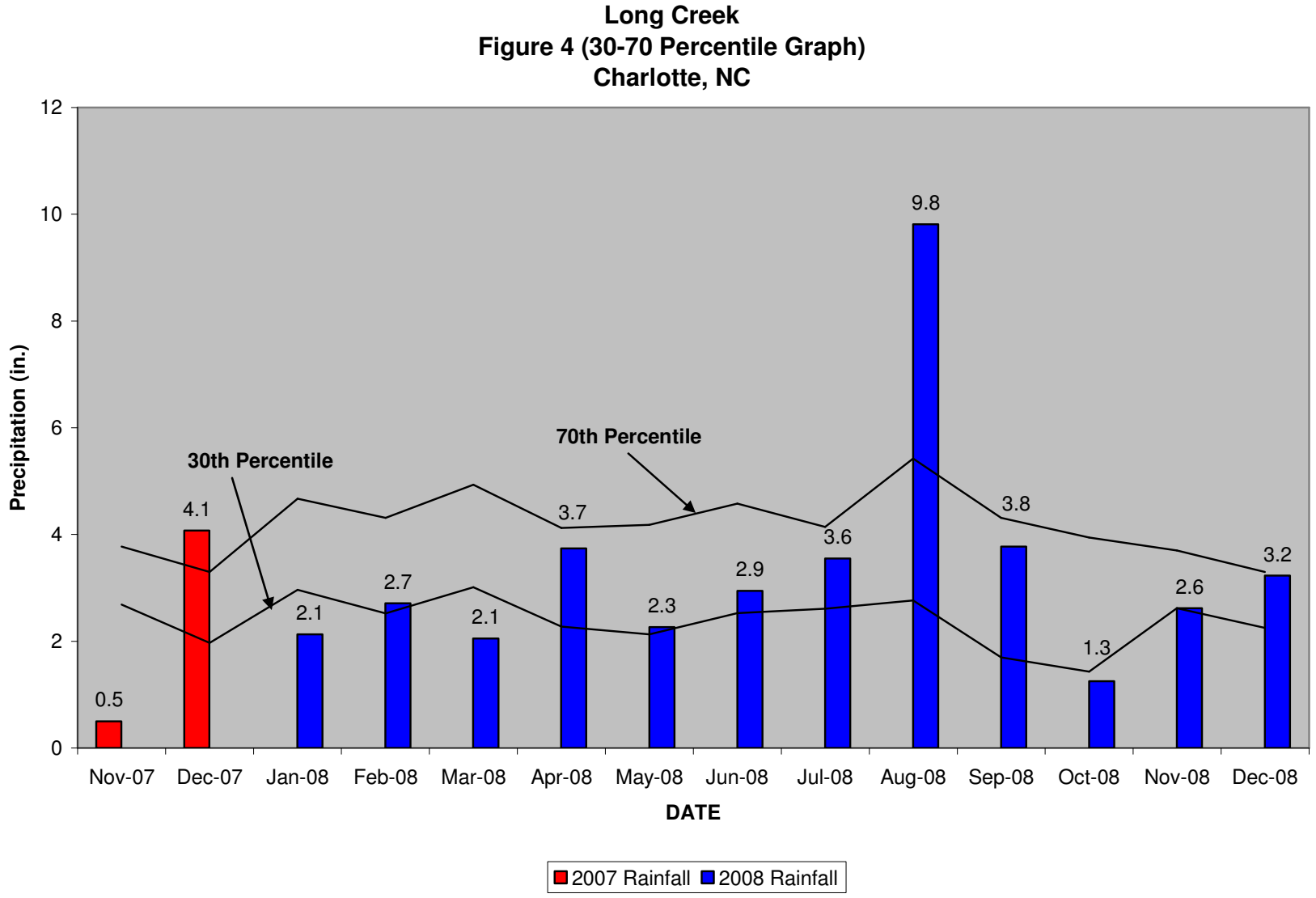


Figure 3. Hydrologic Monitoring Gauge Results

Figure 4. 30-70 Percentile Graph



3.0 VEGETATION: LONG CREEK MITIGATION SITE (YEAR 12 MONITORING)

3.1 Success Criteria

The success criteria state that there must be a minimum mean density of 320 trees per acre of approved target species surviving for at least three years.

3.2 Description of Species

The following tree species were planted in the wetland restoration area:

Fraxinus pennsylvanica, Green Ash

Fraxinus caroliniana, Carolina Ash

Betula nigra, River Birch

Quercus phellos, Willow Oak

Liriodendron tulipifera, Tulip Poplar

Quercus michauxii, Swamp Chestnut Oak

Quercus falcata var. *pagodaefolia*, Cherrybark Oak

Ulmus americana, American Elm

3.3 Results of Vegetation Monitoring

Table 2. Vegetation Monitoring Results

Plot # (Type)	*Green Ash*	*Carolina Ash*	*Cherrybark Oak*	*Swamp. Chestnut Oak*	*American Elm*	*Tulip Poplar*	*River Birch*	*Willow Oak*	Total (12 Year)	Total (at planting)	Density (Trees/Acre)
1 (BLH)	9		6	7			1	8	31	35	602
2 (BLH)	10	2	6	5			2	10	35	35	680
3 (BLH)	6			13	7		4	3	33	35	641
4 (BLH)	12	6	2		10			5	35	35	680
5 (BLH)	10		6		5	2	1	1	25	35	496
6 (BLH)	8		5	2	9	2		7	33	35	641
							AVERAGE DENSITY 622				

Site Notes: Other species noted: sycamore, sweetgum, briars, cedar, dogwood, poison ivy, and various other wetland species.

3.4 Conclusions

Approximately 37 acres of this site were planted in bottomland hardwoods in March 1997. The remaining 5 acres of the site were planted in March 1998. There were six vegetation monitoring plots established throughout the planted areas. The 2008 vegetation monitoring revealed an average tree density of 622 trees per acre. This average is well above the minimum success criteria of 320 trees per acre after three years. NCDOT proposes to discontinue monitoring at the site for vegetation.

4.0 OVERALL CONCLUSIONS AND RECOMMENDATIONS

For the eleventh hydrologic monitoring year, eleven of the eighteen groundwater gauges met the success criteria for jurisdictional hydrology (saturation within 12” of the surface for greater than 12.5% of the growing season). Four gauges reported saturation below 5% and three gauges were in the 5 - 8% range. All four surface water gauges indicated periodic inundation during the growing season.

For the 2008-monitoring year, the site was also monitored for vegetation. The vegetation monitoring revealed an average tree density of 622 trees per acre. This average is well above the minimum success criteria of 320 trees per acre.

The construction activity involved with The Charlotte Outer Loop (I-485), which bisects the Long Creek Mitigation Site, was completed in December 2008. Currently all hydrologic features associated with the roadway are functioning, as surface water is directed across the mitigation site prior to entering Long Creek.

Due to the extensive monitoring at the Long Creek Mitigation Site dating back to the mid nineties, NCDOT is in the process of identifying areas of site that have routinely not met optimum wetland hydrology with environmental agencies. Once these areas are quantified, NCDOT will develop a proposal to reconcile the permits, as well as any outstanding mitigation credits at the site.

APPENDIX A

GAUGE DATA GRAPHS

APPENDIX B

SITE PHOTOS/VEGETATION PLOT & PHOTO LOCATIONS

Long Creek

Photo 1

Photo 2

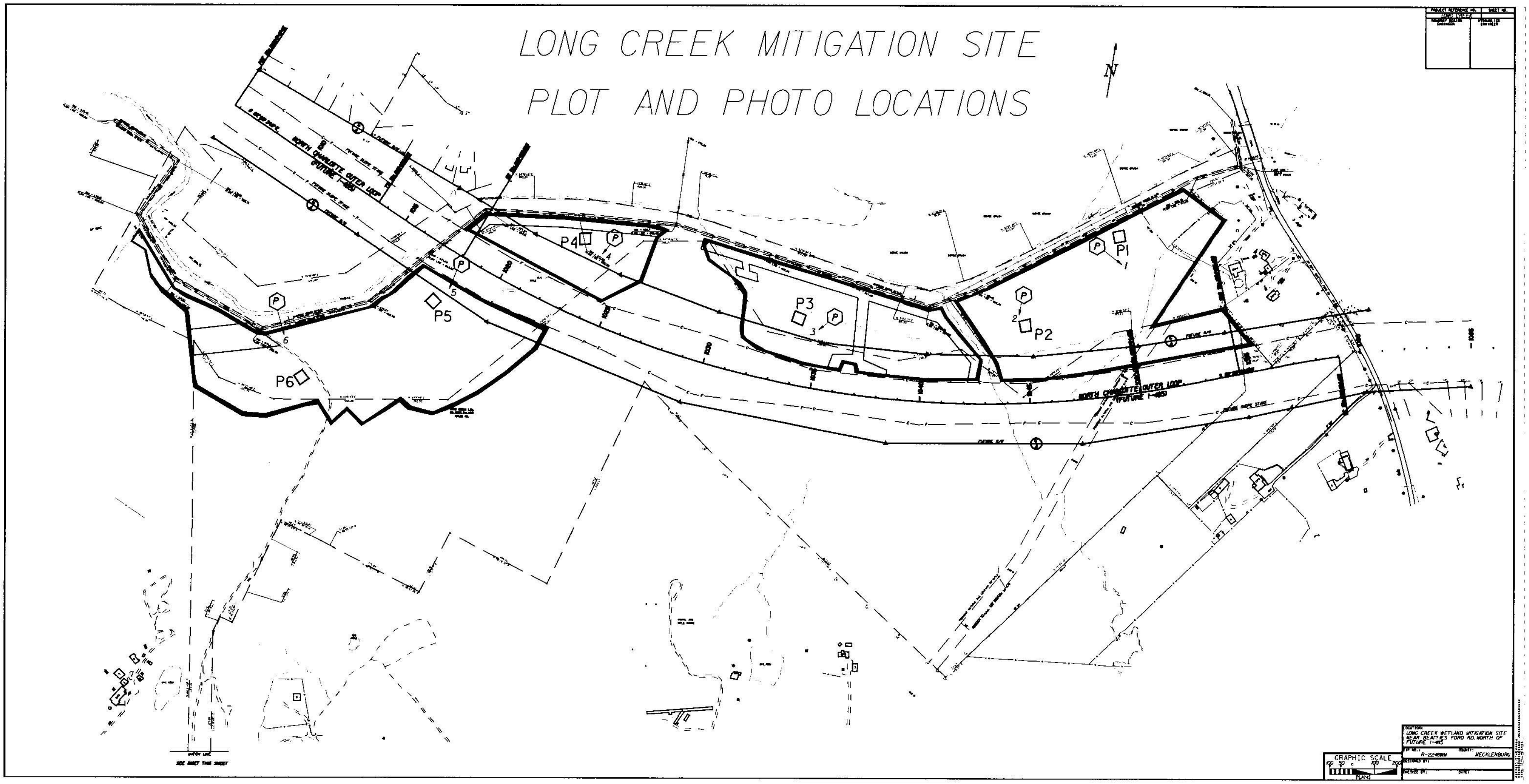
Photo 3

Photo 4

Photo 5

Photo 6

September 2008


LONG CREEK MITIGATION SITE
PLOT AND PHOTO LOCATIONS
N
P1
P2
P3
P4
P5
P6
GRAPHIC SCALE
100 50 0 100 200
PLANS
LONG CREEK WETLAND MITIGATION SITE
NEAR BEATTIES FORD RD. NORTH OF
FUTURE I-485
MECKLENBURG